

8.2 Combustion of fuels

Paraffin, butane, methylated spirits – which is mainly ethanol – and methane are all fuels. When these fuels burn, energy is released.

Aim

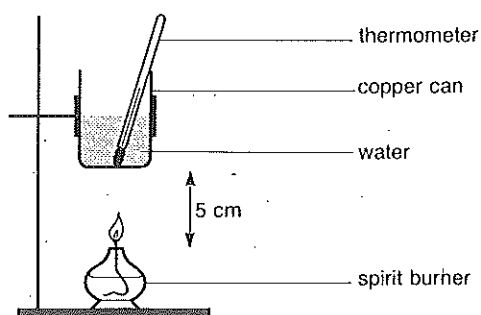
To compare methylated spirits and propanone as fuels.

Apparatus and materials

Copper can
Spirit burner
Stand, boss and clamp with wide jaws
Measuring cylinder, 100 cm³
Thermometer, –10 to +110°C
Balance
Methylated spirits
Propanone

Procedure

- 1 Use a measuring cylinder to pour 100 cm³ of water into the copper can.
- 2 Measure the temperature of the water.
- 3 Half fill a spirit burner with methylated spirits and weigh it.
- 4 Clamp the copper can so that the bottom of the can is about 5 cm above the wick of the spirit burner.
- 5 Light the spirit burner and stir the water with the thermometer.



- 6 When the temperature of the water is 40°C higher than the starting temperature extinguish the spirit lamp. Do not allow the wick to smoulder.
- 7 Reweigh the spirit burner as quickly as possible.
- 8 Repeat steps 1–7 with a fresh supply of water and a spirit burner containing propanone. Make sure that the size of flame is about the same.

Results

Copy and complete the following tables:

a) Methylated spirits

volume of water used	= 100 cm ³
starting temperature of water	= °C
final temperature of water	= °C
rise in temperature	= °C
mass of spirit burner + methylated spirits before burning	= g
mass of spirit burner + methylated spirits after burning	= g
mass of methylated spirits burnt	= g

b) Propanone

volume of water used	= 100 cm ³
starting temperature of water	= °C
final temperature of water	= °C
rise in temperature	= °C
mass of spirit burner + propanone before burning	= g
mass of spirit burner + propanone after burning	= g
mass of propanone burnt	= g

.... produces most energy per gram.

Questions

- 1 a) Describe the appearance of the bottom of the copper can at the end of the experiment.
b) Why must the spirit lamp be weighed immediately after burning some of the fuel?
c) Some of the energy produced by the fuel is not used to heat the water. What happens to this energy?
d) Write equations for the complete combustion of ethanol (C₂H₅OH) and propanone (C₃H₆O).
e) Write equations for the incomplete combustion of ethanol and propanone.